Sulfur Chemiluminescence Analyzers

Laboratory

Process

GALVANIC APPLIED SCIENCES INC.

Galvanic Applied Sciences Inc.

is a company that provides solutions through innovative equipment and design. We are committed to customers' satisfaction and full field service. The 840 series of Chemiluminescence analyzers are second generation systems designed to meet the increasing demands for low level measurement in processes and laboratories. The four models offer sulfur measurement solutions with the latest technology.

Sulfur Chemiluminescence Applications

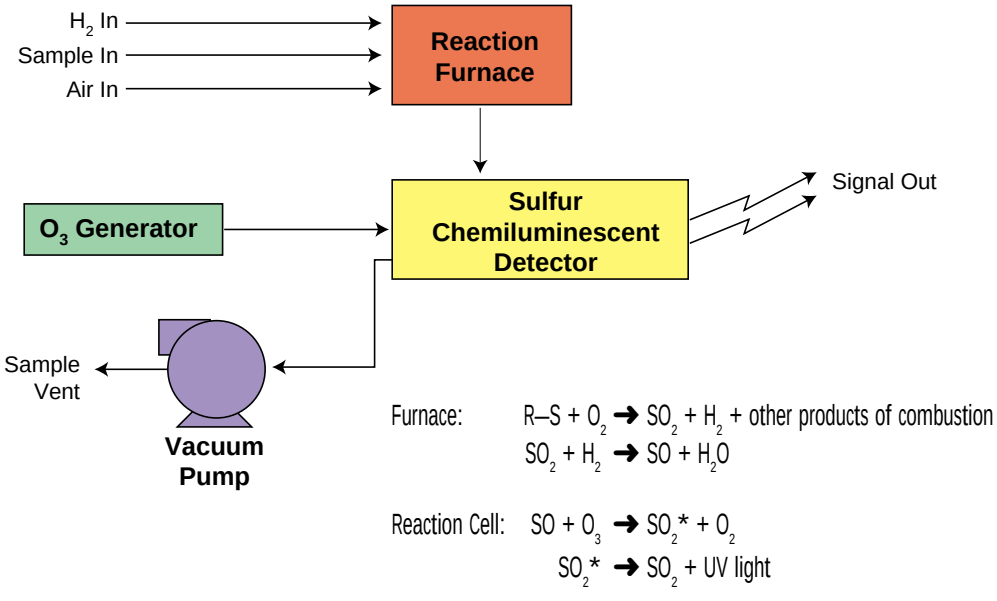
Galvanic Applied Sciences manufactures a complete line of "state of the art" analyzers for lab and process applications which employ sulfur chemiluminescence technology to detect sulfur in a wide variety of hydrocarbon samples. These analyzers measure total sulfur in liquids and sulfur components via gas chromatography in vapor samples.

Some chemiluminescence applications:

- Refined petroleum liquid products
- LPG and LNG products
- Pipeline natural gas and odorization systems
- Refinery and plant fuel gas
- Gasoline and diesel
- Carbon dioxide monitoring for beverages
- Ethylene and propylene

Principle of Operation

Sulfur chemiluminescence is a two stage detection method in which the sample is reduced in air and hydrogen under vacuum to generate sulfur monoxide. The sulfur monoxide is then carried to a reaction chamber where it reacts with ozone to generate sulfur dioxide and light. The light generated is measured by a photomultiplier tube, and this signal is linearly proportional to the quantity of sulfur in the sample.

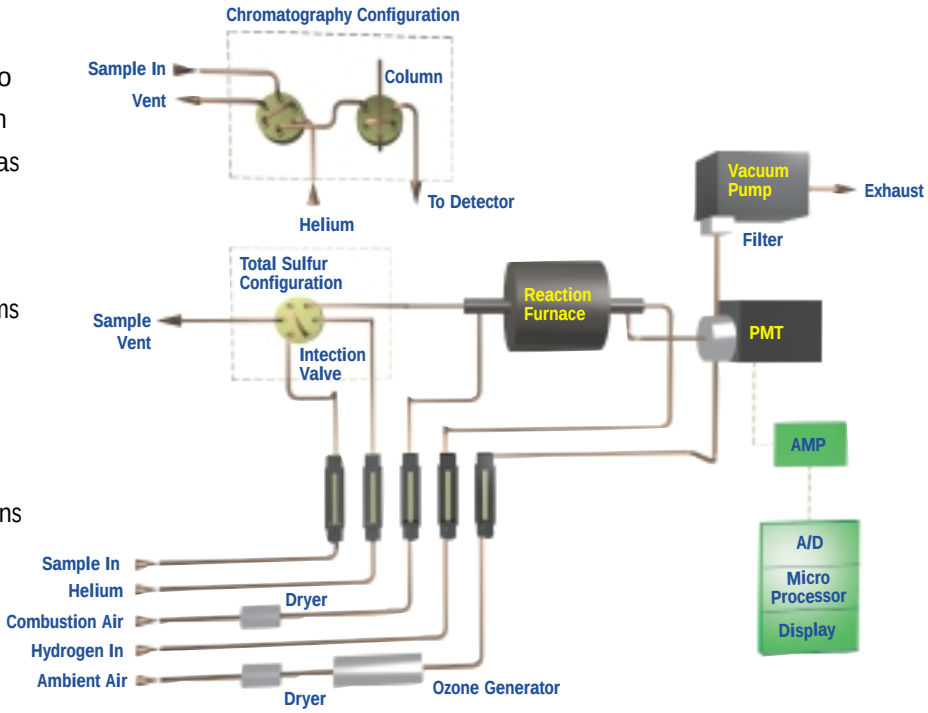


Chromatography

Sulfur chemiluminescence can be used to measure total sulfur in a wide variety of hydrocarbons, ranging from methane to diesel fuel, by simply injecting the sample directly to the detector and measuring all of the sulfurs simultaneously. For gaseous samples, the installation of a chromatograph column prior to the detector allows the measurement of individual sulfur compounds. Since the detection method is equimolar, in response to all sulfurs, a chemiluminescence detector can easily be designed as a chromatograph or as a total sulfur analyzer.

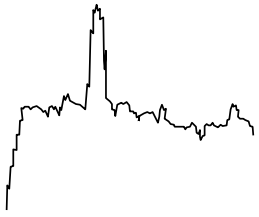
Sulfur chemiluminescence offers several advantages over other sulfur detection systems which make the detector simple to calibrate and use in a wide variety of applications:

- Equimolar response to all sulfurs
- Linearity from ppb to percent concentrations
- Sulfur specific, no known interferences
- Not subject to quenching from hydrocarbons
- Single component standard used for calibration
- Electrically heated reaction, no flame required
- Low hydrogen consumption
- No nuclear / X-ray source



Detector Sensitivity

Sensitivity was measured by making a small partial pressure injection of a 0.8 ppm COS standard. The detector was able to detect 5 ppb of COS with a signal to noise ratio of 10 to 1.



Calibration

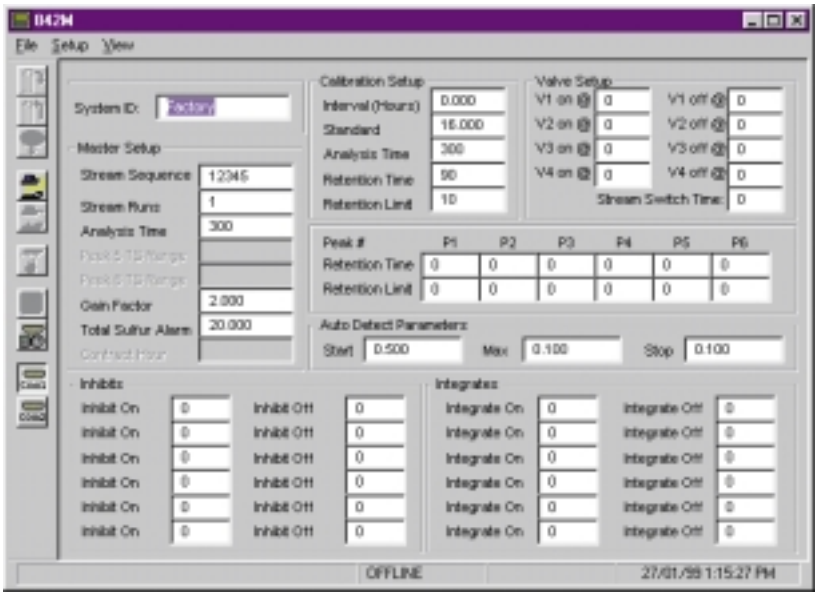
Due to the reactive nature of sulfur compounds, calibration standards containing multiple sulfur components are normally unstable. This is particularly true at the lower ppm levels. The equal and selective response to sulfurs from the “Sulfur Chemiluminescence Detector” allows the standard to be made up with a single least reactive sulfur component in an inert background gas such as nitrogen. This standard is then available for on-line auto calibration and reference check functions eliminating most of the expensive technician time required for other calibration methods commonly used only in the lab.

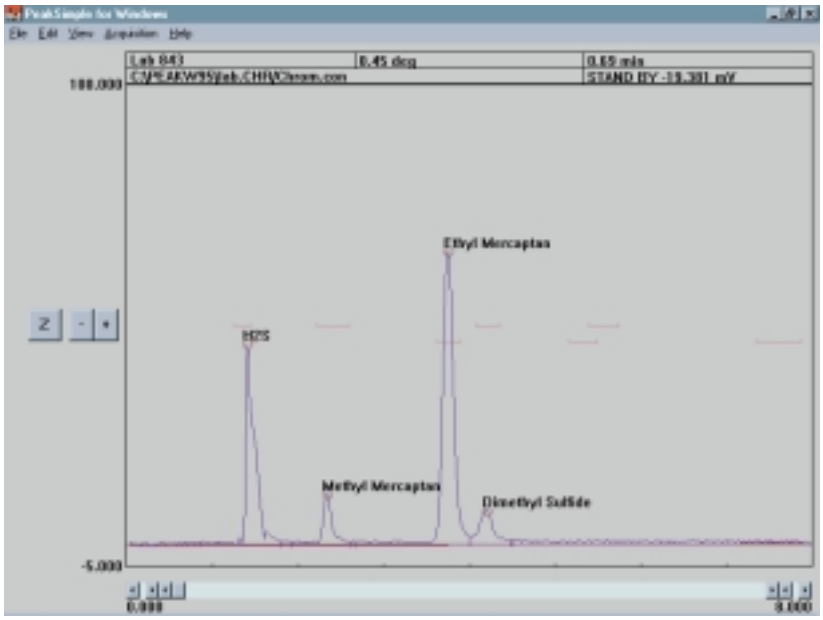
Conventional flame photometric detectors (FPDs), commonly used for sulfur measurement cannot be calibrated in the same manner because the individual sulfurs within a total sulfur peak all respond differently to the detector. A separate response factor would be required for each, which makes calibration costly and time consuming.

Configuration and Monitoring

The 841 and 842 process models include a Windows program for system configuration using Modbus protocol. The user can configure alarms, range, streams and valve times as well as monitoring system operation real time.

The system supports modem interface, uploading and downloading capabilities. The manual and help files are supported in the PC package.





Software

Peak Simple® lab software is a standard option for our laboratory units. This allows the full use of data manipulation and report generation functions.

All process units have a Windows based configuration software package included. This allows for easy configuration via a laptop and downloading capability.

Model 840 Lab

Total Sulfur

for liquids or gases

The Galvanic Applied Sciences' model 840 is a lab analyzer designed to measure total sulfur in gases or liquids. Samples are injected into a heated vaporization block through a septum, either manually or with an auto injector. The 840 is highly flexible, allowing analysis of liquids or gases over a large range of sulfur concentrations. The operation of the 840 is controlled by Peak Simple® software running on a PC or laptop. Extensive reporting options are available, and automated operation is possible with the optional auto injector. No column is required, and analysis times range from three minutes for natural gas to less than ten minutes for diesel fuel.

Model 843 Lab

Total Sulfur and Sulfur Chromatograph

for gases

The model 843 Sulfur Chromatograph is a laboratory analyzer designed for measurement of sulfur components in vapor samples. Sulfur separations are made iso-thermally in a temperature-controlled oven (temperature ramping is optional). Capillary columns of inert silco-steel are used for sulfur separation. These columns provide long life and trouble free operation. The 843 is controlled with Peak Simple® Chromatography software on a standard PC or laptop. The Peak Simple® software allows extensive printed reports, chromatographs and storage of multiple analysis methods.

Model 841

Total Sulfur

for liquids or gases

The 841 is specifically designed to continuously measure total sulfur in either a gas or liquid sample in a process environment.

The 841G for gas measurement uses a chromatograph valve which has been industry proven to provide well over 500,000 injections before requiring a rebuild. Technical innovations in the 841G allow direct total sulfur measurement without the need for columns, or the requirement to backflush heavier components. This translates into a more cost-effective analyzer that is simpler to operate and requires less maintenance.

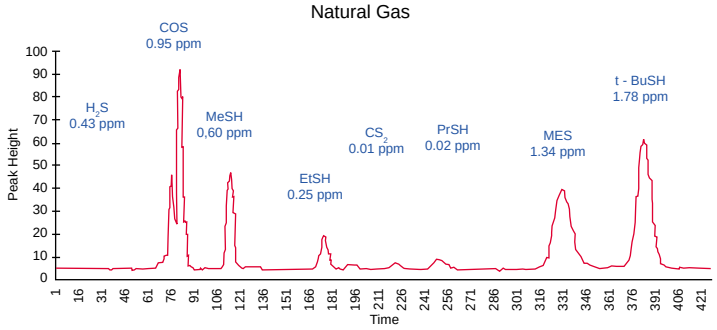
The 841L liquid model uses the well-respected ABB LSV vaporizing liquid injection valve. Flash sample vaporization is key to obtaining a solid analysis in liquid samples. The ABB piston valve has proven vastly superior to old style slider valves in liquids ranging from gasolines through diesels. The use of chromatographic columns in heavy hydrocarbon analysis has proven problematic in the past. The 841L does not require a column and associated hardware to separate the sulfur components, allowing total sulfur in gasoline to be calculated every 5 minutes and diesel every 10 minutes. Unlike some competitive units, the 841L can be set up to measure gasoline and diesel with no configuration changes.

Model 842

Sulfur Chromatograph

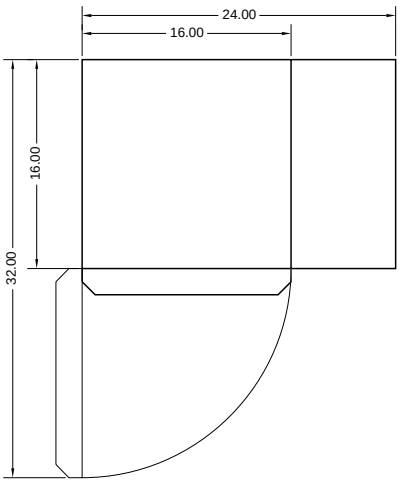
for gases

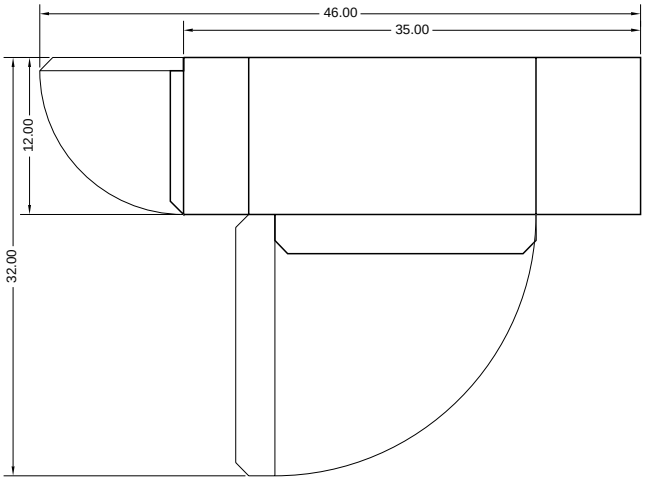
The model 842 Sulfur Chromatograph is an online analyzer designed for unattended measurement of sulfur components in vapor samples. The 842 uses the Valco model VIII chromatograph valve for absolute reliability. Inert silco-steel capillary columns are used for sulfur separation. These columns provide long life and trouble free operation. Sulfur separations can be made isothermally out to C4 mercaptans in less than 10 minutes. The chromatograph is self-contained including an LCD screen and hand held keypad for operator input. Standard outputs are 4-20 ma. Modbus communication is available. The 842 is ideal for monitoring odourant levels in hydrocarbons, and for catalyst protection.

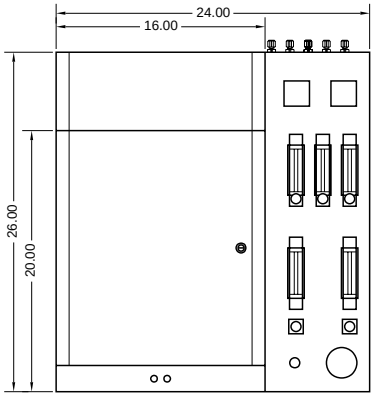


Specification Sheet

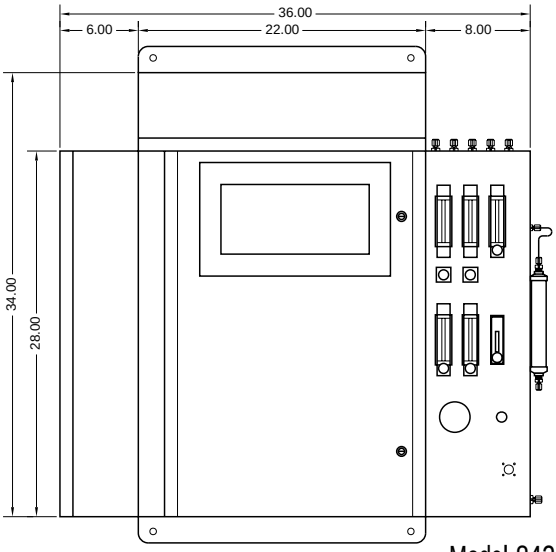
	Laboratory		Process	
	840	**843**	**841**	**842**
Gaseous Range	0–1ppm 0–1% 10 ppb detectability	Sulfur Components 0–1ppm 0–1% 10 ppb detectability	0–1ppm 0–1% 10 ppb detectability	Sulfur Components 0–1ppm 0–1% 10 ppb detectability
Liquid Range	Total Sulfur 0–10 ppm 100 ppb detectability	N/A	Total Sulfur 100 ppb detectability	N/A
Number of Streams	1	1	1	4 plus calibration
Sample Injection System	Syringe	Valco Model VIII	ABB Model LSV 791	Valco Model VIII
Chromatography	No	Yes	No	Yes
Linearity	2%	2%	2%	2%
Repeatability	2%	2%	2%	2%
Response Time	5 min Typical	5 min Typical	5 min Typical	5 min Typical
Electrical Classification (std)	General Purpose	General Purpose	General Purpose	General Purpose
Optional	—	—	CL1, Div2, Grp B,C,D	CL1, Div2, Grp B,C,D
Power Consumption	600 Watts @ 120 VAC 220 VAC Optional	600 Watts @ 120 VAC 220 VAC Optional	600 Watts @ 120 VAC	600 Watts @ 120 VAC
Electronic Platform	Optional Peak Simple Package for Peak Analysis, Valve Control and Report Generation and Archiving	Optional Peak Simple Package for Peak Analysis, Valve Control and Report Generation and Archiving	Dallas 80C320 Microprocessor c/w 16 Bit A/D, 12 Bit D/A 4-20 ma Output, and Intrinsically Safe Keypad	Dallas 87C530 Microprocessor c/w 20 Bit A/D, 12 Bit D/A 4-20 ma Output, and Intrinsically Safe Keypad
Outputs	0–2.5 Volt Sensor Output	0–2.5 Volt Sensor Output	4-20 ma Scaled 4-20 ma Raw Sensor 3–5 amp SPDT Relays 1–2 amp @ 35 VDC Solenoid Driver RS 232 ASCII Serial	2, 4-20 ma Scaled 4-20 ma Raw Sensor 6–5 amp SPDT Relays Modbus Optional 32 4-20 ma Outputs User Assignable
Contact Inputs	Remote Start	N/A	Remote Calibration Start	Remote Calibration Start 4 Status (Dry Contacts)
Dimensions	20"H x 24" W x 16" D	20"H x 24" W x 16" D	28"H x 36"W x 12"D	36"H x 34"W x 12"D
Weight	100 lbs	150 lbs	200 lbs	250 lbs



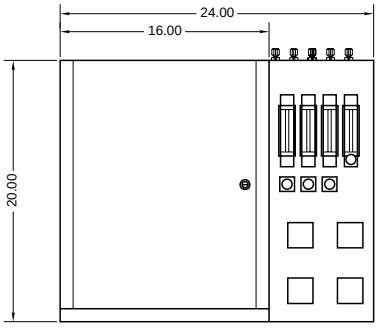




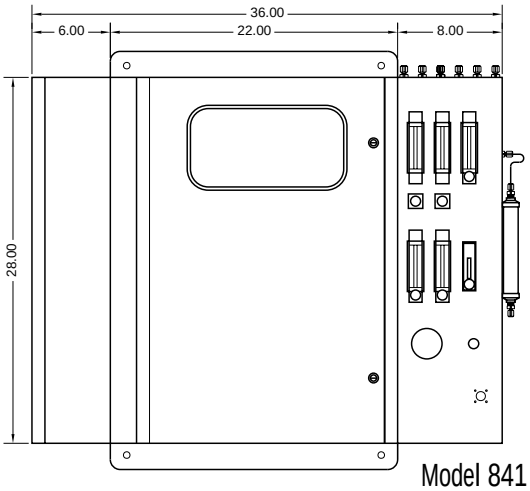
Model 843 Lab Total Sulfur and Sulfur Chromatograph



Model 842 Sulfur Chromatograph



Model 840 Lab Total Sulfur



Model 841 Total Sulfur

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